REMARKS

In paragraph 1 of the final Action, claim 16 was rejected under 35 U.S.C. 112, second paragraph. In view of the rejection, claim 16 has been amended.

In paragraph 4 of the final Action, claims 13-17 were rejected under 35 U.S.C. 103(a) over JP 60-12247 (JP '247) and further in view of EP 554198 (EP '198) and JP 4-300047 (JP '047). In paragraph 5 of the final Action, claims 13-17 were rejected under 35 U.S.C. 103(a) as being unpatentable over JP '047.

However, claims pending in the application are patentable over the cited references.

JP '247 discloses that a coating layer of a casting mold and an intermediate layer back filling the coating layer may comprise: MgO, Al_2O_3, ZrO_2, HfO_2, Y_2O_3, CaO, La_2O_3, CeO_2, BaO, and SiO_2. Applicant's casting mold differs from that of JP '247 in that claim 13 recites a specific selection of materials that form the casting mode, specifically, a casting mold that "consists essentially of yttrium oxide, magnesium oxide and calcium oxide." JP '247 simply discloses that the coating layer may include various oxides, and do not disclose or suggest the specific combination used in the invention.

Furthermore, in claim 13, the casting mold comprises at least first and second layers, "wherein the second layer which backfills the first layer has less yttrium oxide and is more coarsely grained than the first layer." The cited references do not disclose, teach, or suggest at least this feature.

Based upon the specific combination of MgO, Y_2O_3, and CaO for making the first and second layers, as well as by the specific feature wherein the Y_2O_3 content of the second layer is less than that of the first layer and further in view of the relative particle grain size of Y_2O_3 particles of the second layer, the thermal shock properties of the casting mold can be remarkably

improved. In addition, the recited composition yields a tool having very good resistance to highly corrosive molten titanium alloys.

EP '198 discloses a tool for the production of a ferrous metal, i.e. a nickel or cobalt base superalloy. It is well known in the art that reactive nonferrous molten metal, like a titanium aluminum molten alloy, has a much more aggressive resorption behavior vis-à-vis molding materials. A skilled person can not conclude from the suitability of a casting material for nickel or cobalt base superalloys that such a casting material is also suitable for the production of a cast component from a reactive nonferrous molten metal. In this respect, EP '198 shows the back ground of the invention and does not disclose or suggest the features of the invention.

In JP '047, a mold less reactive to titanium or alloy thereof is made. A wax pattern for the mold includes one or more materials among yttria, zirconia, calcia and magnesia, and a backup shell formed outside the wax pattern is made by regular materials. As the regular materials for the backup shell, JP '047 discloses mullite, alumina, zircon sand and silica.

In the invention, the first and second layers of the casting mold are made by yttrium oxide, magnesium oxide and calcium. In JP '047, the inner layer may be formed by yttria, calcia and magnesia, but the backup shell is not made by the same material. Also, the grain size used in the second layer is not disclosed in JP '047. Therefore, JP '047 does not disclose or even suggest the features of the invention.

EP '198, JP '247 and JP '047 singularly, or in any allowable combination does not suggest Applicant's specific composition, in order to form a casting mold for molten titanium alloys, as recited in claims 13 and 15. Furthermore, nowhere does the applied art suggest that selecting materials, such that the second layer has a

lower Y_2O_3 content than the first layer, as well as using more coarsely grain Y_2O_3 particles in the second layer, will result in the improvement of the thermal shock properties of a casting mold and their resistance against titanium alloys, as disclosed by the Applicant.

In the Action, it was held that the use of a lesser amount of yttria for forming the subsequent layer is obvious because yttria is more expensive than zirconia. This argument is not tenable.

According to the present technology, cast components made from a titan aluminum molten alloy have to be machined following the casting process. Namely, it is necessary to smoothen the surface of such cast components by metal-cutting technique. Because of the extreme hardness of such cast components, the metal-cutting is very expensive. Thus, if the metal-cutting is not required, the cost of yttria is not considered.

In fact, the casting tool of the present invention has the essential advantage that the cast components produced by the tool have not to be machined. This advantage can be obtained because of the extremely high mechanical and chemical stability of the proposed casting tool. The enhanced chemical stability is achieved by the selection of three oxides, i.e. yttria, calcia and magnesia, for the manufacture of the tool. Further, the resistance against thermal shock can be increased when using for the second layer less yttria and coarsely grained yttria. The prior art does not even suggest the improved casting tool made by the components as recited in the claims.

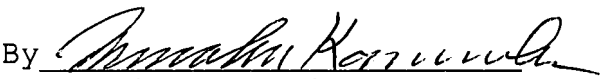
Therefore, independent claims 13 and 15 are patentable not only due to the failure of the applied art to disclose, teach or motivate all recited features of the claims. Claims 14 and 16-17 depend from these independent claims and are likewise patentable over the applied art for at least their dependence on an allowable base claim, as well as for the additional features they recite.

Accordingly, withdrawal of this rejection is respectfully requested.

In view of the foregoing, this application is in condition for allowance. Favorable reconsideration and prompt allowance of claims 13-17 are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully Submitted,

By 

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